INTRODUCTION

Saccades are short in duration (40–90 ms) and high in velocity (up to 800 deg/s). They have a consistent relationship between amplitude and velocity termed the main sequence [1].

However recent studies have shown that the peak velocity may deviate from the main sequence. Saccadic velocity increases when saccades are made in a sequence [6]. Saccadic velocity decreases when repetitively making saccades to the same stimulus [7]. It has been proposed that this stereotyped relationship reflects the optimization of a tradeoff between the precision and duration of saccades [2].

RESULTS

Reinforcement contingencies caused changes in saccadic peak velocity

Here we ask whether changes in saccadic peak velocity may be induced by reinforcement.

METHODS

Four subjects (non naive adults) made saccades to a target appearing 16 deg to the right of the fixation point.

On each trial a reinforcer (a tone) was given or not, depending on the saccadic peak velocity. Reinforcement criteria were computed on a trial to trial basis using a percentile schedule: either the 40% slowest saccades (S1 and S2) or the 40% fastest saccades (S3 and S4) were reinforced.

One point was given when 3 out of 5 consecutive trials were reinforced. Subjects first performed 3 blocks of 400 baseline trials (no reinforcer) and then 10 blocks of 400 learning trials.

CONCLUSIONS

The present experiments provide evidence that saccadic peak velocity can be manipulated by reinforcement contingencies. Other attributes of saccades have been shown to be sensitive to reinforcement such as latency or amplitude [8].

These results suggest that fundamental eye movements dynamics might depend on reinforcement learning.